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NAVFAC **IGS-02821 (MARCH 2003)**

Supercedes IGS-02821 (05/02)

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-02821**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only

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SECTION 02821

CHAIN LINK FENCES AND GATES

03/03

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.

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NOTE: This guide specification covers the requirements for chain-link fencing in Italy and is intended to be used in specifying chain-link fence for general-purpose and special-purpose use. Certain types of security fence must meet the requirements of an applicable OPNAVINST. Edit this specification as needed for the type of fencing required.

Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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NOTE: There are no reference standards in Italy to identify styles and configurations of fence framing, fabric, gates, etc. Most of the local manufacturers custom fabricate work from drawings, and very few of them maintain large quantities of standard fencing and gates. Designer shall provide sufficient detail and specification to thoroughly identify fencing requirements.

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NOTE: The following information shall be shown on the project drawings:

1. Fence alignment.

2. Posts: Minimum height to accommodate fabric and clearance.

3. Post Setting Dimensions: Not less than indicated in chain link manufacturer's installation standards. Assure that embedment length in concrete slabs and walls will be at least 300 mm.

4. Chain-Link Fabric: Height.

5. As required: Top rail, bottom rail, top and bottom reinforcing wires, and where a higher degree of security is required other than provided by fabric, include barbed wire on supporting arms.

6. Sleeve-Type Expansion Couplings: 6.4 m on centers, maximum, if used.

7. Gates: Location, size, and type.

8. Where special fencing requirements exist, such as wolf-proofing, antiburrowing provisions, crossing drainage ditches, provisions for electrical installations, or special security installations, specifications should be modified and appropriate details included on the drawings. Modifications and details should afford security equal to that of the fence.

9. Where special entrance security requirements exist such as electronic locks, motor operated gates, closed circuit video; add details and modify the specification accordingly.

10. Other information necessary to indicate layout and general configuration of the fence.

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM F 883 (1997) Padlocks

EUROPEAN STANDARD (EN)

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NOTE: An EN is a European Standard established on the principle of consensus and adopted by the votes of weighted majority of the members of the European Standards Committee. Adopted standards must be implemented in their entirety as National Standards, regardless of the way the national member voted, and any conflicting national standards must be withdrawn. Available in the English language.

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EN 10244-2 (2001) Steel wire and products - Non ferrous metallic coatings on steel wire - Part 2: Zinc or zinc alloy coatings

EN 10245-2 (2001) Steel wire and wire products - Organic coatings on steel wire - Part 2: PVC finished wire

ITALIAN NATIONAL ASSOCIATION FOR UNIFICATION OF STANDARDS (UNI)

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NOTE: A UNI Norm is a technical normative recognized as Italian Law, submitted by a private organization "Ente Nazionale Italiano di Unificazione" for Italy and is available only in the Italian language. It is the National Standard.

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UNI 9899 (1992) Glass fibre reinforced (GRP) thermosetting resin poles - Requirements and test methods

ITALIAN/EUROPEAN HARMONIZATION STANDARDS (UNI EN)(UNI ENV)(CEI EN) (UNI EN ISO)(UNI ISO)

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NOTE: A UNI EN, UNI ENV, CEI EN, UNI EN ISO or UNI ISO is a European Standard with a coincident Italian National Standard or International Standard. The two standards are identical, with most (but not all) EN's available in the English language and the UNI available only in the Italian language.

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UNI EN 206-1 (2001) Concrete - Part 1: Specification, performance, production and conformity

UNI EN ISO 4892-1	(2002) Plastics - Methods of exposure to laboratory light sources - Part 1: General Guidance
UNI EN ISO 4892-3	(2002) Plastics - Methods of exposure to laboratory light sources - Part 1: Fluorescent UV lamps
UNI ISO 9227	(1993) Corrosion tests in artificial atmospheres - Salt spray tests
UNI EN 10210-1	(1996) Hot finished structural hollow of non-alloy and fine grain structural steels - Technical delivery
UNI EN 10210-2	(1999) Hot finished structural hollow of non-alloy and fine grain structural steels - Tolerances, dimensions and sectional properties
UNI EN 10219-1	(1999) Cold formed welded structural hollow sections of non-alloy and fine grain steel - Technical delivery requirements
UNI EN 10219-2	(1999) Cold formed welded structural hollow sections of non-alloy and fine grain steel - Tolerances, dimensions and sectional properties
UNI EN 10223-1	(1999) Steel wire and wire products for fences - Part 1: Zinc and zinc-alloy coated steel barbed wire
UNI EN 10223-6	(2000) Steel wire and wire products for fences - Part 6: Steel wire chain link fencing
UNI EN 10240	(1999) Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants

1.2 SUBMITTALS

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NOTE: Where a "G" in submittal tags follows a submittal item, it indicates Government approval for that item. Add "G" in submittal tags following any added or existing submittal items deemed sufficiently critical, complex, or aesthetically significantly to merit approval by the Government. Submittal items not designated with a "G" will be

approved by the QC organization.
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Submit the following in accordance with Section 01330, "Submittal Procedures."

SD-02 Shop Drawings

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NOTE: Omit this requirement when contract drawings are so detailed that additional drawings would serve no useful purpose or when there is no requirement for special items such as sliding gates or turnstiles.
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Gates

Turnstiles

Post spacing

Location of gate, corner, end, and pull posts

SD-03 Product Data

Chain-link fencing components

Accessories

SD-06 Test Reports

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NOTE: Require test reports where closer product control is essential or where difficulty might be encountered determining quality of supplied materials.
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Weight in grams for zinc coating

Thickness of PVC coating

SD-07 Certificates

Fabric

Posts

Braces

Framing

Rails

Tension wires

Gates

Padlocks

SD-08 Manufacturer's Instructions

Fence

Turnstiles

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.4 QUALITY ASSURANCE

1.4.1 Materials

All fence materials and components shall be new and fabricated using materials produced from recovered materials to the maximum extent possible.

1.4.2 Workmanship

All fence components shall be free from pits, excessive roughness, blisters, loose rust and mill scale, cracks, and seams to an extent that would be detrimental to the intended end use. Coated surfaces shall be free from uncoated areas except ends of wires on selvage. All fencing components[, except barbed wire and barb selvage of fabric,] shall be free from sharp edges. [Polyvinyl-chloride coated components shall be free from cuts or cracks that permit access of water to the base metal.]

1.4.3 Required Report Data

Submit reports of listing of chain-link fencing and accessories regarding [Weight in grams for zinc coating] [and] [thickness of PVC coating].

PART 2 PRODUCTS

2.1 SOURCE MANUFACTURERS

2.1.1 Fabric

The following manufacturers provide chain link fencing fabric that generally complies with these specifications:

MARIANI
Corso Buenos Aires 65
20124 Milano
Tel: 02-2052171
Fax: 02-2049547

e-mail: info@fratellimariani.it

TRAFILERIA E ZINCHERIA CAVOTORTA, S.p.A.
Via Repubblica, 58
43100 Parma
Tel: 0521-221411
Fax: 0521-221414
www.cavatorta.it

SORINO
Localita Sorino
38083 Condino (Tn)
Tel: 0465-621215
Fax: 0465-621271
e-mail: sorino@sorino.it

METALLURGICA ADRIATICCA S.p.A.
Via Boccaccio 23
20123 Milano
Tel: 02-48193864-48194010
Fax: 02-466596

2.1.2 Gates

The following manufacturers provide prefabricated gates for chain link fence systems that generally comply with these specifications:

METALLURGICA ADRIATICCA S.p.A.
Via Boccaccio 23
20123 Milano
Tel: 02-48193864-48194010
Fax: 02-466596

ORSOGRILL S.p.A.
Via Milano, 51
22063 Cantu (CO)
Tel: 031-700104
Fax: 031-700312

ITALGRIGLIATI
Via Chisini 169
31053 Pieve di Soligo (TV)
Tel: 0438-9864
Fax: 0438-841328
www.italgrigliati.com

2.1.3 Turnstiles

The following manufacturers provide pedestrian barrier turnstiles that generally comply with these specifications:

E.T.E.M. srl
Via 25 Aprile, 7
27010 Valle Salimbene - Pavia

Tel: 0382-485638
Fax: 0382-587305
e-mail: info@etem.it
www.etem.it

S.V.A.R.
via Cappuccina 181
30172 Mestre
Tel: 041-5322732
Fax: 041-5327301
e-mail: info@svar1951.it
www.svar1951.it

STAGNINI
Via Brodolini n. 1
42040 Campegine (RE)
Tel: 0522-677579
Fax: 0522-676677
e-mail: stagnini_recinzioni@libero.it

2.1.4 Posts and Rails

The following manufacturers provide steel pipe, tube and shapes utilized for chain link fencing systems that generally comply with these specifications:

DALMINE S.p.A.
Piazza Caduti 6 Luglio 1944, 1
24044 Dalmine (BG)
Tel: 035-560111
Fax: 035-563381

MARCEGAGLIA S.p.A.
Via Bresciani, 16
46040 Gazoldo Ippoliti - Mantova
Tel: 0376-6851
Fax: 0376-685600

GRUPPO SIDERURGICO LUCCHINI
Via Oberdan, 6
25127 Brescia
Tel: 030-39921
Fax: 030-3992610

MANNI SIDERURGICA S.p.A.
MAGAZZINO LAMIERE
Via Mediana
37060 Mozzecane (VR)
Tel: 045-6339400
Fax: 045-6339435

SICAM S.p.A.
Via Settembrini, 26
20124 Milano

Tel: 02-29404103
Fax: 02-29404356

METALLURGICA ADRIATICCA S.p.A.
Sede e Stabilimento 64018 Tortoreto (TE)
Via Boccaccio 23
20123 Milano
Tel: 02-48193864-48194010
Fax: 02-466596

VETRORESINA ENGINEERING DEVELOPMENT (GRP pipes)
C.da Bondife'
96010 Melilli (SR)
Tel: 931-771401
Fax: 931-767857
www.ved.it

2.1.5 Accessories

The following manufacturers provide accessory components for chain link fencing systems that generally comply with these specifications:

LEON BEKAERT S.p.A.
Via Boccaccio, 25
20123 Milano
Tel: 02-485671
Fax: 02-48008298
e-mail: mp.italy@bekaert.com
www.bekaert.com/mp

TRAFILERIA E ZINCHERIA CAVOTORTA, S.p.A.
Via Repubblica, 58
43100 Parma
Tel: 0521-221411
Fax: 0521-221414
www.cavatorta.it

METALLURGICA ADRIATICCA S.p.A.
Sede e Stabilimento 64018 Tortoreto (TE)
Via Boccaccio 23
20123 Milano
Tel: 02-48193864-48194010
Fax: 02-466596

2.2 CHAIN-LINK FENCING AND ACCESSORIES

Detailed specifications as referenced and other requirements as specified.

2.2.1 Fabric

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NOTE: Coordinate type of fabric with project requirements. Typical mesh size and tolerances, and wire diameters are given in Table 1 of UNI EN

10223-6. Edit sizes as required for project requirements. Standard selvage treatment for fabric 1.52 m and less is knuckled at both selvages. Fabric with heavier zinc coating or polyvinyl chloride (PVC) coatings may be useful in highly corrosive environments. Aluminum fabric is not commonly used or in production in Italy.

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NOTE: Choose core wire diameter appropriate for the design. Polyvinyl chloride (PVC) coating may be specified for other than security purposes when aesthetics are of prime importance and the additional cost is justified. There are different PVC-coated fabrics on the market. Some ways in which they may vary are: The methods of applying PVC coating, wall thickness of PVC coating, adhesion of PVC coating to wire, and cost. Take these factors into consideration when selecting a fence fabric for different environmental applications. PVC coating of fencing for certain security applications and fencing requiring grounding must be designed and specified very carefully.

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UNI EN 10223-6, [zinc-coated steel, EN 10244-2, class A] [polyvinyl chloride (PVC) coated over zinc-coated steel, EN 10245-2], [3.0 mm] [3.55 mm] diameter core wire size. Mesh size, 50 mm. Provide selvage [knuckled at one selvage and twisted and barbed at the other] [twisted and barbed at both selvages] [knuckled at both selvages]. Height of fabric, as indicated.

2.2.2 Gates

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NOTE: The gate frames and intermediate braces indicated are adequate for gate sizes less than or equal to 2.4 m high and 4.3 m wide. Gate configurations larger than 2.4 m high and 4.3 m wide shall require special design consideration.

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NOTE: There are no Italian norms for description of fencing and gate types. Provide additional descriptive data and/or details to show intent.

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[Single swing type] [Double swing type] [Single cantilever sliding, wheel sliding type gate] [Double cantilever sliding type]. Shape and size of gate frame, [as indicated] [_____]. Framing and bracing members, [round] or [square] of steel, [zinc-coated] [or] [PVC-coated over zinc-coated steel]. Gate frames and braces shall be [48 mm] [____ mm] od, [3 mm] [____ mm] minimum wall thickness unless indicated otherwise. Gate fabric, as

specified for fencing fabric. [Barbed wire top on gate, as specified herein.] Coating for steel latches, stops, hinges, keepers, and accessories, [galvanized] [PVC, minimum thickness of 0.25 mm.] [Special gate frames, [as indicated] [_____].] [Gate leaves more than 2.4 m wide shall have intermediate members as necessary to provide rigid construction, free from sag or twist.] [Gate leaves less than 2.4 m wide shall have truss rods or intermediate braces.] Attach gate fabric to gate frame in accordance with manufacturer's standards, except that welding will not be permitted. Arrange padlocking latches to be accessible from both sides of gate, regardless of latching arrangement.

a. Frames shall have all welded construction with [zinc-coated by the hot dip] [or] [metal spray] method finish after fabrication.

b. When barbed wire top is required, the vertical members of the gate frame shall extend 300 mm above the top horizontal section of the gate frame. 3 strands of barbed wire, uniformly spaced, shall be attached to the extended members by bands, clips, or eyebolts.

2.2.2.1 Single Gate Latches

Fork type, formed steel gravity drop bar type with positive locking features, or plunger bar type of full gate height. Fabricate latches with integral eye openings for padlocking; padlock shall be accessible from both sides of gate. Galvanized finish.

2.2.2.2 Double Gate Latches

Fork type, formed steel latch with center drop rod, or plunger bar type of full gate height arranged to engage the gate stop, or a positive locking gravity device. Locking devices shall be constructed so that the center drop rod or plunger bar cannot be raised when locked. Fabricate latches with integral eye openings for padlocking; padlock shall be accessible from both sides of gate. Galvanized finish.

2.2.2.3 Stops

Center gate stop shall be provided for all double gates and shall be suitable for setting in concrete or with anchors for the center drop rod or plunger. Formed steel or malleable iron, galvanized finish.

2.2.2.4 Keepers

Keepers shall be provided for each gate leaf over 1500 mm wide. Gate keepers shall consist of a formed steel mechanical device for securing the free end of the gate when in full open position.

2.2.2.5 Gate Hinges

Steel gate hinges shall be of adequate strength for the gate and shall have large bearing surfaces for clamping or bolting in position. Hinge action shall be such that gates may be easily opened and closed by one person. Hinges shall provide for full 3.14 rad swing of gate leaf.

2.2.2.6 Rollers

Heavy duty steel rollers shall be equipped with steel ball bearings. Non-sealed type bearings shall be provided with a grease fitting. Rollers shall be secured to the gate post or gate frame without welding.

2.2.3 Turnstiles

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NOTE: 3-wing turnstiles are not of common/standard production.
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Provide [galvanized steel] [metal], [three] [four] wing turnstile consisting of a rotor, cage, ceiling plate, and bottom bearing plate. [Provide electronic opening and closing [by card key] [_____].] Provide [continuous turn] [one way continuous turn] [one-third turn and stop] [one-fourth turn and stop] motion.

2.2.4 Posts [, Top Rails] [, Bottom Rails] and Braces

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NOTE: Use as many of the options as possible consistent with functional requirements. Allow Class 3, formed steel sections as an alternative if no other requirements prohibit their use on a particular job.Certain security applications using intrusion detection sensors, must use steel pipe framework only. For rails and braces, use sizes shown on drawings.
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NOTE: Aluminum sections are not of standard production. Show dimensions for pipe and sections on the drawings or edit this paragraph to add sizes.
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UNI EN 10210-1, UNI EN 10210-2, UNI EN 10219-1, and UNI EN 10219-2. Fabricate fence posts, braces, and rails of [round steel pipe] [formed steel sections] [square steel tube]. [Provide hot-dip zinc-coating applied after fabrication with 0.54 kg per sq. meter of zinc coated surface area per UNI EN 10240.] [Provide PVC color coating, 2.5 mm minimum thickness.] [Steel pipe shall meet the following performance criteria when subjected to salt spray testing in accordance with UNI ISO 9227:

a. Exterior [_____] [1,000] hours with maximum 5 percent red rust.

b. Interior [_____] [650] hours with maximum 5 percent red rust.]

2.2.4.1 Composite Posts

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NOTE: For High Security or for taut wire system use

steel post. Provide as alternative to PVC coated fence posts, and use where corrosion is a problem. Since posts are non-conductive, fence grounding procedures need to be detailed where grounding of the fence is required.

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UNI 9899. Polyester resin reinforced posts shall be produced from polyester or epoxy resin, reinforced with E-glass and filler material. Posts shall be filled with 20 MPa concrete. Posts shall be protected from UV degradation by a veil of polyester cloth impregnated with resin and an acrylic based 0.037 mm DFT coating system. The post will exhibit no structural failure (less than 10 percent loss of strength) as a result of exposure to moisture and UV lamps per UNI EN ISO 4892-1 and UNI EN ISO 4892-3, (3600 hours). Posts shall be provided [green], [black], [brown] in color to match fabric. [Provide outside diameter [of ___ mm] [as indicated on drawings] for round steel pipe.]

2.2.5 Fencing Accessories

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NOTE: Polyvinyl chloride (PVC) coated ties shall be specified when PVC-coated fence fabric is required.

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Provide wire ties constructed of the same material as the fencing fabric. [Provide accessories with polyvinyl (PVC) coatings similar to that specified for chain-link fabric or framework.]

2.2.6 Barbed Wire and Support Arms

2.2.6.1 Barbed Wire

UNI EN 10223-1. Barbed wire shall consist of two 2.5 mm twisted line wires with 2.0 mm round barbs. Barbed wire shall be zinc-coated steel, or PVC over zinc-coated steel. All barbs shall consist of 4 points and spaced at 120 to 130 mm on center.

2.2.6.2 Support Arms

Provide [single arm for supporting 3 barbed wire strands] [V-shaped double arms for supporting 6 barbed wire strands] [A-shaped double arms for supporting 5 barbed wire strands]. When installed, the barbed wire support arms shall project at an angle of 0.785 rad from the plane of the fence line and the outer strand of barbed wire shall be positioned 300 mm horizontally from the fence line. Intermediate strands of barbed wire shall be uniformly spaced along the arm.

a. Support arms shall be fitted with clips or slots for attaching the barbed wire to the support arm.

b. Support arms shall be capable of withstanding a load of 115 kg applied vertically to the arm.

c. Finish support arms to match posts.

2.2.7 Concrete

[UNI EN 206-1, using 19 mm maximum-size aggregate, and having minimum compressive strength of 20 MPa at 28 days.] [Provide as specified in Section 03300, "Cast-In-Place Concrete."]

2.2.8 Grout

Provide grout of proportions one part portland cement to three parts clean, well-graded sand and a minimum amount of water to produce a workable mix.

2.2.9 Padlocks

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NOTE: Consult station regarding padlocks. Most stations will provide padlocks. If Contractor furnished padlocks are required for certain security applications, a padlock conforming to an appropriate Military Specification may need to be specified. See referenced specification for types, grades, and options available. There are no Italian references available for locks. Need to provide additional characteristics for padlocks.

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ASTM F 883, with chain.

PART 3 EXECUTION

3.1 SITE PREPARATION

3.1.1 Clearing and Grading

Clear fence line of trees, brush, and other obstacles to install fencing. Establish a graded, compacted fence line prior to fencing installation. Compact fill used to establish fence line.

3.1.2 Excavation

Excavate to dimensions indicated for concrete-embedded items, except in bedrock. If bedrock is encountered, continue excavation to depth indicated or 450 mm into bedrock, whichever is less, with a diameter in bedrock a minimum of 50 mm larger than outside diameter of post. Clear post holes of loose material. Dispose of waste material [outside limits of station] [on station, as directed].

3.2 FENCE INSTALLATION

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NOTE: Certain security applications require conformance to an applicable OPNAVINST. Use bracketed sentences as required by the applicable

OPNAVINST.

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Install fence on prepared surfaces to line and grade indicated. [Secure fastening and hinge hardware in place to fence framework by peening or welding. Allow for proper operation of components. Coat peened or welded areas with a repair coating matching original coating.] Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

3.2.1 Post Spacing

Provide line posts spaced equidistantly apart, not exceeding 3 m on center. Provide gate posts spaced as necessary for size of gate openings. Do not exceed 152 m on straight runs between braced posts. Provide corner or pull posts, with bracing in both directions, for changes in direction of 0.26 rad or more, or for abrupt changes in grade. Provide drawings showing location of gate, corner, end, and pull posts.

3.2.2 Post Setting

Set posts plumb. Allow concrete [and grout] to cure a minimum of 72 hours before performing other work on posts.

3.2.2.1 Earth and Bedrock

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NOTE: Alternate drive anchor method may be specified as an option where evidence indicates that optional method under similar ground conditions has satisfactory and proven performance record.

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Provide concrete bases of dimensions indicated [except in bedrock]. Compact concrete to eliminate voids, and finish to a dome shape. [In bedrock, set posts with a minimum of 25 mm of grout around each post. Work grout into hole to eliminate voids, and finish to a dome shape.]

3.2.2.2 Concrete Slabs and Walls

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NOTE: Use the following paragraph where required by the design, otherwise delete. Sleeve joints for nonremovable fence sections are usually filled with lead or nonshrink grout. Removable fence sections may be useful as an economical means for providing access to equipment. Sleeve joints in removable fence sections may be a tight sliding type, or where moisture entry could be a problem, filled with pipe sulphur jointing compound.

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Set posts into zinc-coated sleeves, set in concrete slab or wall, to a minimum depth of 300 mm. Fill sleeve joint with lead, nonshrink grout, or

other approved material. Set posts for support of removable fence sections into sleeves that provide a tight sliding joint and hold posts aligned and plumb without use of lead or setting material.

3.2.3 Bracing

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NOTE: Use a single diagonal truss rod for fences less than 3.7 m high. Use two diagonal truss rods on fences 3.7 m and higher.
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Brace gate, corner, end, and pull posts to nearest post with a horizontal brace used as a compression member, placed at least 300 mm below top of fence, and [a diagonal truss rod and truss tightener used as a tension member] [two diagonal truss rods and truss tighteners used as tension members].

3.2.4 [Top] [and] [Bottom] Rails

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NOTE: Top rails offer a handhold to climbers, therefore do not specify where security is of utmost importance. A top rail may be specified on fences where appearance is an important factor and the added cost is justified. Specify bottom rails only when required by the design.
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Install [top] [and] [bottom] rails before installing chain-link fabric. Pass top rail through intermediate post caps. Provide expansion coupling spaced as indicated.

3.2.5 Top and Bottom Tension Wires

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NOTE: Coordinate with requirements for top and bottom rails. Bottom tension wire is desirable to maintain fence alignment and will be retained except for designs requiring bottom rail.
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Install [top] [and] [bottom] tension wires before installing chain-link fabric, and pull wires taut. Place top and bottom tension wires within 200 mm of respective fabric line.

3.2.6 Fabric

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NOTE: Coordinate with requirements for reinforcing wire and top and bottom rails. Certain security applications require fabric to be embedded into the ground or into a concrete curb. When security fencing with intrusion detection sensors is

required, include bracketed sentence dealing with deflection of fabric.

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Pull fabric taut and secure fabric to [top rail] [and] [bottom rail] [and] [top wire] [and] [bottom wire], close to both sides of each post and at maximum intervals of 600 mm on center. Secure fabric to posts using stretcher bars, ties or clips spaced 375 mm on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate posts for full length of each post. Install fabric on opposite side of posts from area being secured. Install fabric so that bottom of fabric is 50 mm above ground level [embedded as indicated]. [Install fence fabric to provide approximately 50 mm deflection at center of fabric span between two posts, when a force of approximately 133 N is applied perpendicular to fabric. Fabric should return to its original position when force is removed.]

3.3 ACCESSORIES INSTALLATION

3.3.1 Post Caps

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NOTE: Coordinate with requirements for top rails or supporting arms.

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[Design post caps to accommodate top rail.] Install post caps as recommended by the manufacturer.

3.3.2 Supporting Arms

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NOTE: Coordinate with requirements for top rails. Use supporting arms and barbed wire only when required by applicable OPNAVINST or by Station.

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Design supporting arms to accommodate top rail. Install supporting arms as recommended by manufacturer. In addition to manufacturer's standard connections, permanently secure supporting arms to posts. Studs driven by low-velocity powder-actuated tools may be used with steel, wrought iron, ductile iron, or malleable iron. Do not use studs driven by powder-actuated tools with gray iron or other material that will fracture.

3.3.3 Barbed Wire

Install barbed wire on supporting arms above fence posts. Extend each end member of gate frames sufficiently above top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Pull each strand taut and securely fasten each strand to each supporting arm or extended member. Secure wires in accordance with fence manufacturer's recommendations.

3.3.4 Gates

NOTE: Special items, such as sliding gates complete with rollers and roller tracks, should be shown and specified. Consideration should be given to the need for detail drawings for these items.

Install swing gates to swing through [1.57] [3.14] rad from closed to open.

3.3.5 Turnstiles

Install in accordance with manufacturer's instructions.

3.3.6 Padlocks

Provide padlocks for gate openings and provide chains that are securely attached to gate or gate posts. Provide padlocks keyed alike, and provide two keys for each padlock.

3.4 GROUNDING

NOTE: Grounding requirements may be indicated on the drawings, specified in a separate section in Division 16, or included in this section. Specify polyvinyl chloride coated fencing with care when grounding is a project requirement.

Ground fencing as [indicated] [specified in Division 16].

3.5 SECURITY

NOTE: Delete this paragraph if new fencing does not involve relocation or replacement of existing security fencing. Depending on nature of fence work, paragraph may need further elaboration regarding necessary construction to maintain perimeter.

Install new security fencing, remove existing security fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Contracting Officer and cognizant Security Officer.

3.6 CLEANUP

Remove waste fencing materials and other debris from the station.

-- End of Section --